

# National Bureau of Standards

## Certificate

### Standard Reference Material 4257

#### Manganese-54

#### Radioactivity Standard

This Standard Reference Material consists of manganese-54 in \_\_\_\_\_ grams of carrier solution in a flame-sealed borosilicate-glass ampoule. The solution contains approximately 64 micrograms of manganese chloride per gram of approximately 1 molar hydrochloric acid and has a density of  $1.016 \pm 0.002$  grams per milliliter at  $21^{\circ}\text{C}$ .

The radioactivity concentration of the manganese-54 at 1200 EST on April 30, 1979, was

$$*6.058 \times 10^5 \text{ s}^{-1}\text{g}^{-1} \pm 1.02\%*$$

This Standard Reference Material was prepared from dilutions of a master solution from which quantitative sources were prepared and  $4\pi(\text{e}, \text{x})-\gamma$  coincidence counted using the efficiency-extrapolation method.

The uncertainty in the radioactivity concentration, 1.02 percent, is the linear sum of 0.19 percent, which is the limit of the random error of the coincidence measurements at the 99-percent confidence level ( $3.499 S_m$ , where  $S_m$  is the standard error of the mean computed from independent measurements on 8 sources) and 0.83 percent, which is the linear sum of the estimated upper limit of conceivable systematic errors.

The solution from which this Standard Reference Material was prepared was examined for photon-emitting impurities with germanium-spectrometer systems and none was observed. Conservative detection limits for photons from possible impurities, expressed as percentages of the gamma-ray-emission rate of the 835-keV gamma rays emitted in the decay of manganese-54, are approximately 0.1 percent for photons with energies between 7 keV and 830 keV, and 0.01 percent for those between 840 and 1900 keV. Iron-55 was suspected to be present, and at the time of certification its activity was estimated to be less than  $3 \times 10^{-2}$  percent that of the manganese-54.

This Standard Reference Material was prepared in the Center for Radiation Research, Nuclear Radiation Division, Radioactivity Section, W. B. Mann, Chief.

Washington, D.C. 20234  
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Office of Standard Reference Materials

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